

Claims

1. A communication device comprising:

a capacitor and an inductor arranged as a
5 matching circuit, the matching circuit having an
impedance;

a ferro-electric material positioned to
adjust a value that is a member of the group
10 consisting of a capacitance value of the
capacitor and an inductance value of the
inductor;

a control line operably connected to the
ferro-electric material;

a control source electrically connected to
15 the control line, the control source configured
to transmit a control signal on the control line;

wherein the ferro-electric material,
responsive to the control signal, adjusts the
value to change the impedance of the matching
20 circuit.

2. The communication device of claim 1, wherein
the quality factor of the matching circuit, when
operated in a temperature range between about -50
25 degrees Celsius and 100 degrees Celsius, is greater

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than about 80 in a frequency range between 0.25 GHz and 7.0 GHz.

3. The communication device of claim 1, wherein the quality factor, when operated in a temperature range between about -50 degrees Celsius and 100 degrees Celsius, is greater than about 80 in a frequency range between about 0.8 GHz and 7.0 GHz.
4. The communication device of claim 1, wherein the quality factor, when operated in a temperature range between about -50 degrees Celsius and 100 degrees Celsius, is greater than about 80 in a frequency range between about 0.25 GHz and 2.5 GHz.
5. The communication device of claim 1, wherein the quality factor, when operated in a temperature range between about -50 degrees Celsius and 100 degrees Celsius, is greater than about 80 in a frequency range between about 0.8 GHz and 2.5 GHz.
6. The communication device of claim 1, wherein the quality factor, when operated in a temperature range between about -50 degrees Celsius and 100 degrees Celsius, is greater than about 180 in a frequency range between 0.25 GHz and 7.0 GHz.
7. The communication device of claim 1, wherein the quality factor, when operated in a temperature range between

about -50 degrees Celsius and 100 degrees Celsius, is greater than about 180 in a frequency range between about 0.8 GHz and 2.5 GHz.

8. The communication device of claim 1, wherein the quality

5 factor, when operated in a temperature range between about -50 degrees Celsius and 100 degrees Celsius, is greater than about 80 for a capacitance in a range between about 0.3 pF and 3.0 pF.

9. The communication device of claim 1, wherein the quality

10 factor, when operated in a temperature range between about -50 degrees Celsius and 100 degrees Celsius, is greater than about 80 for a capacitance in a range between about 0.5 pF and 1.0 pF.

10. The communication device of claim 1, wherein the

15 quality factor, when operated in a temperature range between about -50 degrees Celsius and 100 degrees Celsius, is greater than about 180 for a capacitance in a range between about 0.3 pF and 3.0 pF.

11. The communication device of claim 1, wherein the

20 quality factor, when operated in a temperature range between about -50 degrees Celsius and 100 degrees Celsius, is greater than about 180 for a capacitance in a range between about 0.5 pF and 1.0 pF.

12. The communication device of claim 1, wherein:

the control signal comprises a direct current voltage;

the control source is coupled to a band select signal, the band select signal comprising
5 a signal identifying a band in which the matching circuit is to operate; and

the control source comprises:

a lookup table comprising the direct current voltage value corresponding to the
10 band in which the matching circuit is to operate; and

a voltage source for generating the direct current voltage responsive to the direct current voltage value.

15 13. The communication device of claim 1, wherein the control source comprises a power detector which detects a power level of an RF signal and varies the control signal responsive to the power level of the RF signal.

14. The communication device of claim 1, wherein the
20 control source comprises a lookup table and varies the control signal responsive to a value in the lookup table.

15. The communication device of claim 1, wherein the capacitive element comprises a capacitor and the inductive element comprises an inductor.

16. The communication device of claim 1, wherein:

the capacitive element is coupled between an
input and an output; and

the inductive element is coupled between the
5 output and ground.

17. The communication device of claim 1, wherein:

the inductive element is coupled between an
input and ground; and

the capacitive element is coupled between
10 the input and an output.

18. The communication device of claim 1, wherein:

the inductive element is coupled between an
input and an output and

the capacitive element is coupled between
15 the output and ground.

19. The communication device of claim 1, wherein:

the capacitive element is coupled between an
input and ground; and

the inductive element is coupled between the
20 input and an output.

20. The communication device of claim 1, wherein:

the capacitive element comprises a
capacitor, the capacitor comprising a gap; and

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the ferro-electric material is positioned in
or near the gap for adjusting the capacitance
value of the capacitor.

21. The communication device of claim 1, further
5 comprising an amplifier coupled to the matching circuit.

22. The communication device of claim 21, wherein the
amplifier is a low noise amplifier.

23. The communication device of claim 21, wherein the
amplifier is a power amplifier.

10 24. The communication device of claim 1, further
comprising:

an antenna coupled to a first port of the
matching circuit; and
a duplexer coupled to a second port of the
15 matching circuit.

25. The communication device of claim 1, further
comprising:

an antenna coupled to a first port of the
matching circuit; and
a diplexer coupled to a second port of the
20 matching circuit.